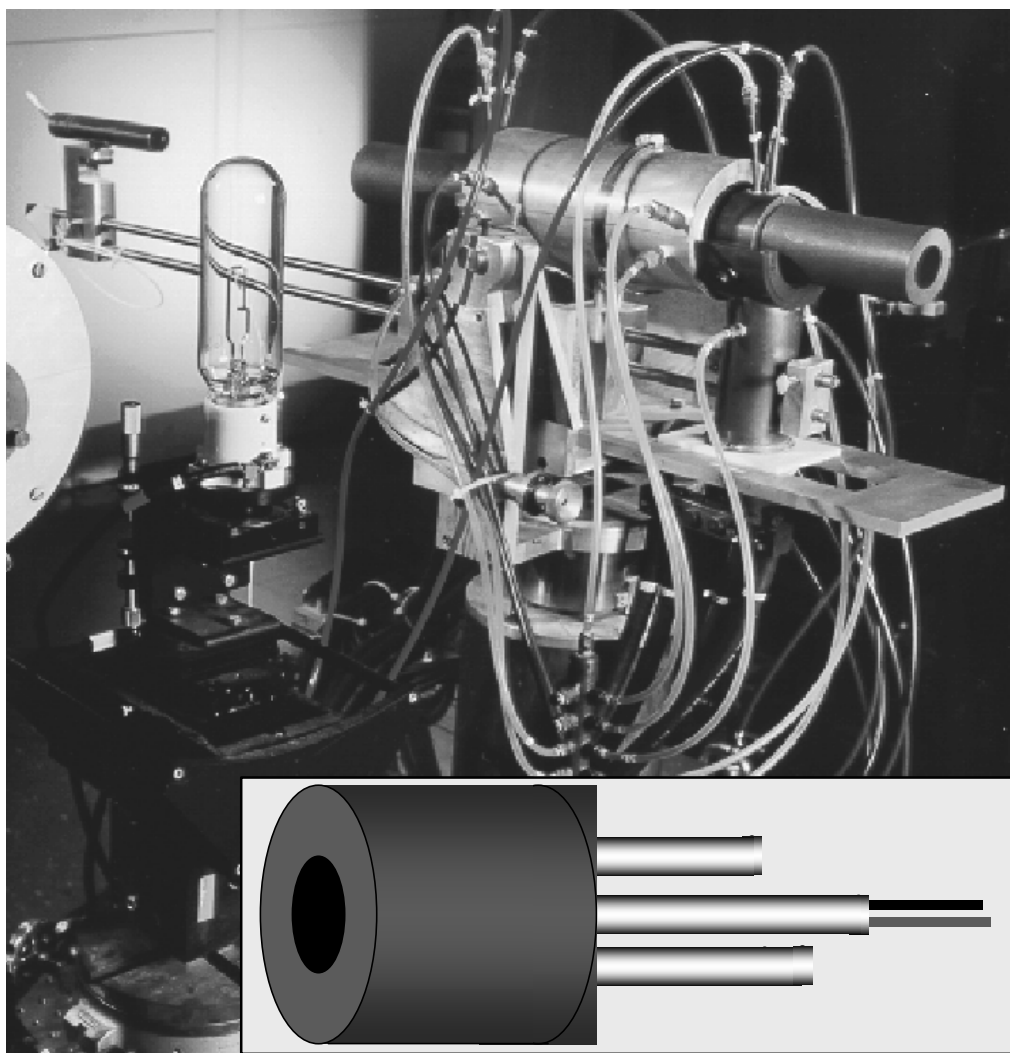


Heat-Flux Sensor Calibration



**NIST
Special
Publication
250-65**

**Benjamin K. Tsai, Charles E. Gibson, Annageri V. Murthy, Edward A. Early,
David P. Dewitt, and Robert D. Saunders**

**U.S. Department of Commerce
Technology Administration**
National Institute of Standards and Technology

NIST Special Publication 250-65

NIST MEASUREMENT SERVICES:

Heat-Flux Sensor Calibration

Benjamin K. Tsai, Charles E. Gibson, Annageri V. Murthy, Edward A. Early,
David P. Dewitt, and Robert D. Saunders

Optical Technology Division
Physics Laboratory
National Institute of Standards and Technology
Gaithersburg, MD 20899-0001

May 2004

U.S. DEPARTMENT OF COMMERCE

Donald L. Evans, Secretary

Technology Administration

Phillip J. Bond, Under Secretary for Technology

National Institute of Standards and Technology

Arden L. Bement, Director

National Institute of Standards and Technology Special Publication 250-65
Nat. Inst. Stand. Technol. Spec. Publ. 250-65, 37 Pages, (May 2004)
CODEN: NSPUE2

NIST PRINTING AND DUPLICATING OFFICE
GAITHERSBURG, MD: 2004

PREFACE

The calibration and related measurement services of the National Institute of Standards and Technology are intended to assist the makers and users of precision measuring instruments in achieving the highest possible levels of accuracy, quality, and productivity. NIST offers over 300 different calibrations, special tests, and measurement assurance services. These services allow customers to directly link their measurement systems to measurement systems and standards maintained by NIST. These services are offered to the public and private organizations alike. They are described in NIST Special Publication (SP) 250, NIST Calibration Services Users Guide.

The Users Guide is supplemented by a number of Special Publications (designated as the "SP250 Series") that provide detailed descriptions of the important features of specific NIST calibration services. These documents provide a description of the: (1) specifications for the services; (2) design philosophy and theory; (3) NIST measurement system; (4) NIST operational procedures; (5) assessment of the measurement uncertainty including random and systematic errors and an error budget; and (6) internal quality control procedures used by NIST. These documents will present more detail than can be given in NIST calibration reports, or than is generally allowed in articles in scientific journals. In the past, NIST has published such information in a variety of ways. This series will make this type of information more readily available to the user.

This document, SP250-65 (2004), NIST Measurement Services: Heat-Flux Sensor Calibrations is a new publication. It covers the calibration of heat-flux sensors (test number 35101C in SP250, NIST Calibration Services Users Guide). Inquiries concerning the technical content of this document or the specifications for these services should be directed to the author or to one of the technical contacts cited in SP250.

NIST welcomes suggestions on how publications such as this might be made more useful. Suggestions are also welcome concerning the need for new calibrations services, special tests, and measurement assurance programs.

John R. Rumble, Jr.
Director
Measurement Services

Katharine B. Gebbie
Director
Physics Laboratory

ABSTRACT

The Optical Technology Division at NIST is developing techniques to calibrate heat-flux sensors to meet the current calibration needs of U.S. science and industry. An outcome of this effort is a calibration service offered now through NIST Calibration Services to calibrate heat-flux sensors up to 50 kW/m^2 . The calibration, performed using the 25 mm Variable-Temperature Blackbody as a broadband radiant source, transfers calibration from a primary electrical substitution radiometer standard to the heat-flux sensor. In contrast to other calibration methods using temperature traceability, the objective of this calibration is to provide heat-flux traceability to NIST primary standards. This report gives the calibration principle, the associated laboratory procedure, safety, and typical calibration results of a Schmidt-Boelter type heat-flux sensor.

KEY WORDS: Blackbody, heat flux, sensor

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